

Acronym: MISSE-6A and 6B

Title: Materials International Space Station Experiment - 6A and 6B

Principal Investigator(s):

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Developer(s):

Marshall Space Flight Center, Huntsville, AL

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Langley Research Center, Hampton, VA

United States Department of Defense Space Test Program, Johnson Space Center, Houston, TX

Sponsoring Agency: National Aeronautics and Space Administration (NASA)

Increment(s) Assigned: 16, 17, 18, 19, 20

Brief Research Summary (PAO): Materials on the International Space Station Experiment 6 (MISSE-6A and 6B) is a test bed for materials and coatings attached to the outside of the space station that are being evaluated for the effects of atomic oxygen, direct sunlight, radiation and extremes of heat and cold. This experiment allows the development and testing of new materials to better withstand the rigors of space environments. Results will provide a better understanding of the durability of various materials in space, leading to the design of stronger, more durable spacecraft components.

Research Summary:

- MISSE-6A and 6B will assess impacts of the space environment (vacuum, solar radiation, atomic oxygen, micrometeorites and thermal cycling, etc.) on materials.
- Specimens include candidate spacecraft materials for long-term exposure to the space environment.
- Following return to Earth these materials will be analyzed to determine which materials could withstand the harsh environment of space and can be used in the design of future spacecraft.

Detailed Research Description: The samples for MISSE-6A and 6B include over 400 new and affordable materials that may be used in advanced reusable launch systems and advanced spacecraft systems including optics, sensors, electronics, power, coatings, structural materials and protection for the next generation of spacecraft. The development of new generations of materials and material technologies is essential to the mission of traveling beyond Earth's orbit. The samples are installed in holders and placed in experiment trays, called passive experiment containers (PECs).

Project Type: Payload

Images and Captions:



NASA Image: STS105-346-007 - Astronaut Patrick G. Forrester, during the second STS-105 extravehicular activity, prepares to work with the Materials International Space Station Experiment 1 and 2 (MISSE-1 and 2). The experiment was installed on the outside of the Quest Airlock during the first extravehicular activity (EVA) of the STS-105 mission. MISSE will collect information on how different materials weather in the environment of space.



NASA Image ISS013E63407: Image of MISSE 3 following deployment on the outside of ISS on August 3, 2006.

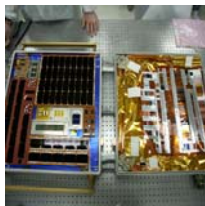
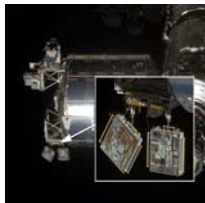


Image of MISSE-5 samples prior to launch to the International Space Station for deployment during Increment 11. Image courtesy of NASA, Johnson Space Center.



NASA Image: s123e009655 - Close-up view of Materials International Space Station Experiment-6A and 6B (MISSE-6A and 6B) Passive Experiment Container on European Laboratory/Columbus. Photo was taken during flyaround of STS-123 Space Shuttle Endeavor.

Operations Location: ISS External

Brief Research Operations:

- Crewmembers will deploy the MISSE-6A and 6B PECs during an EVA (extra vehicular activity).
- Images of the PECs are captured during EVAs for the duration of the deployment.
- Crewmembers retrieve MISSE-6A and 6B during an EVA after approximately one year of exposure.

- The samples will be returned to the various investigator teams for analysis following their return to Earth.

Operational Requirements: MISSE-6A and 6B is mounted to the Station's exterior on a truss segment. It requires power provided by the Station, but does not require crew interaction. The critical interaction is between the samples and the space environment.

Operational Protocols: During extravehicular activity astronauts will install the MISSE-6A and 6B on the ISS. During EVAs throughout the deployment of MISSE-6A and 6B crewmembers will capture snapshots of the PECs, if time permits. Another set of crewmembers in a later increment will retrieve MISSE-6A and 6B when the experiment is completed. The samples will be returned to the investigators, who will carefully examine each to determine how the materials fared.

Review Cycle Status: DoD Reviewed

Category: Technology Development

Sub-Category: Spacecraft Materials

Space Applications: Results will provide a better understanding of the durability of various materials when they are exposed to the space environment. Many of the materials may have applications in the design of future spacecraft.

Earth Applications: The new advanced materials and components that will be demonstrated in MISSE-6 A&B will improve the performance, increase the useful life, and reduce the costs of future space operations of commercial weather, communication and Earth observation satellites that we all now depend on.

Manifest Status: Continuing

Supporting Organization: Department of Defense (DoD)

Previous Missions: NASA has conducted a series of space experiments to determine the best materials to survive in the space environment on Shuttle and Mir. MISSE-1 and 2 were delivered to ISS on STS-105 in August 2001 and returned on STS-114 in August 2005. MISSE-5 was deployed during STS-114 and is scheduled for return on STS-115. MISSE-3 and 4 were delivered to ISS on STS-121 in July 2006 and scheduled for return on STS-118.

Related Publications:

de Groh KK, Banks BA, Dever JA, Jaworske DA, Miller SK, Sechkar E, Panko SR NASA Glenn Research Center's Materials International Space Station Experiments NASA/TM 2008 ;2008-215482

Web Sites:

[MISSE Experiment](#)
[Langley News](#)

Related Payload(s): ISSI, MISSE Investigations, PFMI

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